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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CARIASO, ALAN B

ART UNIT	PAPER NUMBER
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2875

DATE MAILED: 01/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/342,210

Applicant(s)

KOHNO, MICHIO

Examiner

Alan Cariaso

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 9, 10, 27 and 28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 11-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Prosecution Application

1. The request filed on October 23, 2001 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/342,210 is acceptable and a CPA has been established. An action on the CPA follows.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

3. The disclosure is objected to because of the following informalities:
4. Page 11, line 23, it appears that drawing reference numeral "8" is incorrect and should be replaced with - 3--, since reference numeral -3- appears to be designated "the second focal (point) plane" as done on pg.12, line 21.
5. Page 17, lines 10 and 15, the abbreviation "NA" should additionally be written in its full text.
6. Page 19, line 3, it appears that drawing reference letter "b" is incorrect and should be replaced with - d--, which would correctly point to a Gaussian distribution transformed from the distribution labeled as "c" as described on the bottom lines of page 18 to the top lines of page 19.

Appropriate correction is required.

7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The claimed limitations termed as "a light directing optical system" (claims 1,2,12,22) and "a light collecting optical system" (claim 11) should be included in the specification as alternative terms used for the intended portion of the illumination optical system, especially since it appears that this portion of the illumination optical system to which this directing and collecting take place is predominantly referred as the "converting optical system 12".

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-8 and 11-26 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites "wherein light incident on the light transmitting element has a numerical aperture, at an entrance surface of the light transmitting element, which is smaller than a numerical aperture of light incident on said light directing optical system". Claim 2 recites "wherein the numerical aperture of said light directing optical system on the light transmitting

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element side thereof is smaller than the numerical aperture of said imaging optical system on the light transmitting element side thereof". Claim 11 recites "a light collecting optical system being effective to make small the numerical aperture". Claim 12 recites "wherein the numerical aperture of said light directing optical system on the optical fiber bundle side thereof is smaller than the numerical aperture of said imaging optical system on the optical fiber bundle side thereof". Claim 22 recites "wherein the numerical aperture of the light emitted from said light directing optical system is smaller than the numerical aperture of the light impinging on the predetermined plane". These recitations that state numerical apertures and their relative sizes at different parts of a light path are not adequately supported by the specification for first, second, third, and fifth embodiments (figs 7, 10, 12, and 14, respectively). The only mention of any numerical aperture is of an "NA" on page 17, lines 10-15 which also describes the fourth embodiment shown in fig. 13. However, this fourth embodiment does not describe relative sizing of the numerical apertures and discloses two laser light sources which do not define the "imaging optical system for forming an image of a light source" recited in claims 1, 2, and 12.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-8 and 11-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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12. Claims 1, 2, 11 and 12, the limitation "an imaging optical system for forming an image of a light source by use of light from the light source" is indefinite as being the actual light source and reflector before entering the light directing optical system or the imaging optical system after passing the light directing optical system. It would be mis-descriptive to define the light source and elliptical reflector as an imaging optical system, especially since the specification refers to imaging optics other than the light source optics as shown in reference numerals (106,206,5{pg.13, lines 8-10}) and therefore the claims recite an incorrect relationship between the imaging optical system (according to the disclosure) with the other parts of the illumination optical system. Furthermore, the "imaging optical system" would not correctly define the two laser light sources of fig. 13 (4th embodiment) if this limitation was meant to be the light sources prior to light entering the converting optics (12), since there are no conceivable imaging and use of optics. However, if the imaging optical system is intended to be the optical system receiving light from the converting optical system (12), then the functional recitations of each of the recited optical systems in claims 1, 2, 11 and 12 are incorrect or at least incomplete.

13. Claims 1, 2, 11, 12 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are those between the total reflection light transmitting element or optical fiber bundle,

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the imaging optical system, the light directing optical system or light collecting optical system.

14. Claim 2, lines 8 and 9, "the light transmitting element side" of the light directing optical system and of the imaging optical system, respectively, have no antecedent basis.

15. Claims 3 and 13, "an optical axis" is indefinite as to which optical system this axis belongs.

16. Claims 6 and 16, the phrase "said imaging optical system includes first and second lens units" is indefinite as being misdescriptive. These two lens units are being identified as the imaging optical system which is contrary to what is disclosed as the converting optical system (12) or as understood in the claim as being the light directing optical system. Clarification in the claim is needed as to which optical system forms the light source image and which optical system receives the light source image at its entrance pupil.

17. Claim 11, the phrase "being effective to make small the numerical aperture thereof" is indefinite as lacking structure in the claim to support this function.

18. Claim 11, last line, the limitation "the numerical aperture thereof" is indefinite as being unclear as of what side or part of the invention this numerical aperture is defined.

19. Claim 11, the term "small" which designates the size of the numerical aperture is relative term which is considered vague and indefinite as lacking a reference or defined quantity to define "small".

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20. Claim 12, lines 7 and 8, "the optical fiber bundle side" of the light directing optical system and of the imaging optical system, respectively, have no antecedent basis.

Claim Rejections - 35 USC § 102

21. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

22. As can be interpreted, claims 1-4 and 11-14 are rejected under 35 U.S.C. 102(e) as being anticipated by TOMIOKA et al (US 5,971,576).

23. As recited in claim 1, TOMIOKA discloses an illumination optical system (figs. 8,13) having a total reflection type light transmitting element (light guide 17); an imaging optical system (mirror 12 or 20) forming an image (18) of a light source (13,13a); a light directing optical system (14) directing light from the light source image (18) to the light

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transmitting element (17), wherein light incident on the entrance surface ("r7") of the light transmitting element (17, fig.8) has a numerical aperture (NA=0.66; col.9, lines 38-39) which is smaller than a numerical aperture (paraxial relation of 0.74; col.9, lines 40-45) of light incident on the entrance surface ("r1") of the light directing optical system (14).

24. As recited in claims 2 and 12, TOMIOKA includes the imaging optical system, light transmitting element (light guide 17) or an optic fiber bundle (light guide 24 with plural optic elements on the cross section thereof in fig.15C), and light directing optical system as in preceding claim 1, with further recitations "wherein the numerical aperture of said light directing optical system on the light transmitting element side thereof is smaller than the numerical aperture of said imaging optical system on the light transmitting element side thereof" and "wherein the numerical aperture of said light directing optical system on the optical fiber bundle side thereof is smaller than the numerical aperture of said imaging optical system on the optical fiber bundle side thereof" which are paraphrased in claims 2 and 12, respectively, to basically express the same numerical apertures of the incident light at the entrance surface of the light transmitting element and at the entrance surface of the light directing optical system. Claims 2 and 12 further include a surface to be illuminated (col.1, lines 29-35) by the illumination optical system with light transmitted by the light transmitting element or optical fiber bundle (light guides 17 or 24), anticipated by TOMIOKA.

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25. As recited in claims 3 and 13, TOMIOKA discloses the light source image having an illuminance which is larger in a portion adjacent an optical axis than in a peripheral portion about the optical axis (col.6, lines 24-32; see fig. 9, col.8, line 63 to col.9, line 9).

26. As recited in claims 4 and 14, TOMIOKA discloses the imaging optical system including an elliptical mirror (22, fig. 15A, col.12, lines 27-34), wherein the light source (center of filament 13a, fig.15A) is disposed at one focal point (A) of said elliptical mirror (22), and wherein the light source image is formed at another focal point (B) of the elliptical mirror.

27. As recited in claim 11, TOMIOKA discloses the familiar imaging optical system (mirror 12, fig.8), an optical fiber bundle (light guide 24 with plural optic elements on the cross section thereof in fig.15C), a light collecting optical system (lens 14, fig.8) for directing light from the light source image (18) in the optical fiber bundle (light guide 17) and being effective to make small the numerical aperture (at r7) thereof.

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

29. Claims 5, 15 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over TOMIOKA et al (US 5,971,576).

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30. Claims 5 and 15 recite "the light source comprises a Hg lamp", not disclosed by TOMIOKA. It would have been obvious to one having ordinary skill in the art at the time of applicant's invention to provide the illumination optical system of TOMIOKA to include the Hg light source, since it was known in the art that applicant's Hg light source is known to be art-equivalent to the halogen or gas discharge light sources used by TOMIOKA and the selection of any of these known equivalents to direct light toward a light transmitting element would be within the level of ordinary skill in the art.

31. In regards to claims 22-24, TOMIOKA discloses applicant's invention including the total reflection type light transmitting element (17,24) being equivalently an optical rod (light guide), light directing optical system with the claimed numerical aperture sizing, and surface to be illuminated. However, TOMIOKA does not disclose the light directing means being plural lasers light sources. TOMIOKA teaches plural light sources (fig.15A) being the source filament ("A" or 13a, fig.15A) and its image ("B",fig.15A) formed by the mirror (22) for the purpose of producing direct and reflected light beams (figs.15B,15C) incident on a predetermine plane ("r1",fig.8 from real and image light sources 13a and 18, respectively) at different angles (as best shown by corresponding ray lines associated from each light source incident on the entrance surface "r1" of lens 14a). It would have been obvious to one having ordinary skill in the art at the time of applicant's invention to modify the illumination optic system of TOMIOKA to include the light directing means or two laser light sources since the examiner takes Official Notice of an equivalence of two laser sources and spaced positioned real and image light sources for their use in the art and the selection of any

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of these equivalent sources of light beams to direct light toward a plane or entrance plane of an optical system would be within the level of ordinary skill in the art.

Conclusion

32. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. YANEZ (US 4,883,333) teaches that the entrance face of a fiber optics cable has small numerical aperture, relative to image light source, and therefore one or more lenses are used to direct most of the light energy onto the face of the fiber optic cable (col.1, bottom paragraph).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Cariaso whose telephone number is (703) 308-1952. The examiner can normally be reached on M-F (9:00-5:00 PM). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703) 305-4939. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

AC
January 27, 2002

Alan Cariaso
Primary Examiner
Art Unit 2875

